

RESPONSE TO 102 REJECTION

The Office Action alleges that applicant's claims 52 and 78 are rejected under 35 U.S.C. 102(b) as being anticipated by Krall (US 5,621,299).

Applicant herein submits the following reasoned arguments to overcome the Office Action's rejection. The response is presented in four sections, as follows:

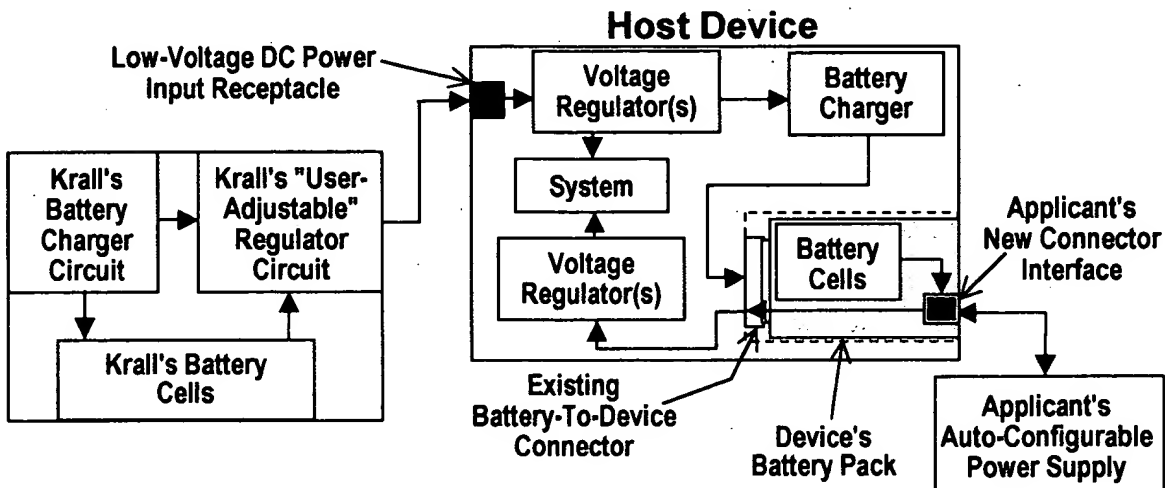
- An overview of the differences in the operational environment of the prior art as compared to applicant's claimed invention, showing physical features of the apparatuses to be substantially different;
- A discussion of the terminology in the subject claims as differentiating applicant's claimed invention from the prior art;
- Detailed reasoned arguments as to the specific objections as cited in the Office Action;
- Summary

Comparative Overview of Operating Environments

In order to fully respond to the 102 rejection, an overview of operational environments that compares the prior art to applicant's claimed invention is presented here to better distinguish the differences in physical features, as well as to show the novelty and unobviousness of applicant's invention over the prior art.

Sketch A depicts a simplified block diagram representing a battery-powered host device to which is attached both Krall's external battery source/"user-adjustable" regulator based on Krall's Fig. 1, and applicant's fully auto-configurable external power supply.

Sketch A



What Krall teaches falls into the category of peripheral devices generally identified as "extended run-time batteries." The basic elements of Krall's battery source/regulator are identified as a cluster of battery cells, serviced by a battery charger. The battery cells are the primary source of power for Krall's "user-adjustable" power-output regulator (Col. 3, lines 65-66). Krall's battery charger circuit can also serve as a power source to the user-adjustable regulator, but only when an input power source (external AC/DC, or DC/DC power-conversion adapter) is attached to the battery charger circuit (Col. 4, lines 49-54).

Before discussing the different features of Krall as compared to applicant's claimed invention, a general comment about the prior art's input power source mode of operation. It does not solve the problem Krall professes his invention overcomes. The problem, as he presents it, is: "It can be very awkward to have to carry separate battery packs and/or power supplies for each of several pieces of portable electronic equipment. Further, if the user desires to be able to operate or recharge each of several pieces of equipment from more than one source, such as from both AC house current and a car battery, for example, it may be necessary for the user to carry two or more separate power supplies and/or types of interconnecting cables for each piece of equipment. . . Therefore, it is a primary object of the present invention to provide an external power supply for such equipment that overcomes these disadvantages to the user" (Col. 1, lines 53-55).

Krall's invention does not solve the problem, because a user now carries an awkward battery so large that it requires considerable room in a briefcase. Also, a user still needs to carry at least one of either an AC/DC or DC/DC power-conversion adapter (Col. 4, lines 59-65). Likely, a typical mobile traveler will carry both, using the AC/DC element in hotel rooms, while the DC/DC adapter is used onboard commercial aircraft (most of which now provide passengers with 15 VDC power outlets at each seat) or in a car.

Compare Krall's bulky apparatus to applicant's universal power supply which, in its external peripheral modality as shown in Figs. 10-11, is no larger than an original manufacturer's power-conversion adapter, but is capable of configuring its output to virtually any mobile device. In its embedded version, as for installation at aircraft seats, a user does not have to carry anything, as all power-delivery circuits, cords, connectors, etc., are already in place, as described in applicant's Specification on Page 3, lines 5-29.

Krall's Batteries Are Problematic

A further downside to using Krall's invention is that his external battery cells require charging. Krall is somewhat vague as to whether both the battery charger and adjustable output-regulator circuits can output sufficient power to simultaneously recharge his invention's battery cells and also be concurrently powering a host device with sufficient current to be charging the device's internal battery cells while also powering the device itself. Such multiple concurrent events are highly probable while traveling, in a situation of a user arrives at a hotel and needs to use the host device, replenish the device's internal battery, and also recharge Krall's external battery cells. One indicator that such a real-world scenario is potentially problematic is that Krall bemoans the fact that "...these small power supplies are usually capable of providing only a small current." (Col. 4, lines 57-59).

Krall further has not dealt with issues relating to using his external battery as a means of

charging a host device's internal battery. Krall acknowledges that "Any internal rechargeable battery is charged by supplying power through the same input receptacle." (Col. 1, lines 31-33). Host device's equipped with rechargeable batteries are virtually always configured to prioritize charging these internal batteries. This charging function can account for up to 60% of the power that is available to the host device, and devices cited by Krall, such as laptop computers, handhelds, etc., are all designed to prioritize their internal battery charging functions. Even when a host device's battery is fully charged, the internal battery charger will still turn on for some short period of time in order to "top off" the device's battery. Operationally, Krall's external battery power source is extremely inefficient, because much of Krall's attached battery's energy is being utilized by the attached host device to top off its internal battery. This topic will be covered in greater detail in a later section.

Applicant resolves these issues by electro-mechanically isolating the host device's battery from its internal charging circuit, so that battery charging is an electrically isolated and totally discrete function that can occur simultaneously with (but always independently from) powering a host device.

Applicant's Claimed Invention Resolves Krall's Problem

There is a solution to Krall's dilemma of the precious energy resources stored in his external battery that are wasted by using them to recharge a device's internal battery. Directing Krall's external battery power 11-13 through his power-output circuit 19 then through applicant's new connector interface for delivery to the host device would preserve the prior art's battery resources by eliminating unwanted and energy-inefficient charging of the device's internal battery. This would certainly extend the run time of Krall's battery 11-13. Secondly, by his apparatus attaching to a host device through applicant's new battery connector, Krall's user-adjustable output-voltage circuit (Fig 7) would have access to the host device's battery for acquiring information about the proper output voltage his allegedly "automatic" configuring. Using applicant's superior interface

would eliminate the need for both his user-adjustable potentiometer, and his even more complex user-directed VOM. Thus, applicant's adapted device's new connector interface solves many of Krall's problems, which not only differentiates it from the apparatus of Krall, but also reveals the advantages of the claimed invention that, until now, were unappreciated by those skilled in the arts, those advantages here including energy conservation, and the elimination of unpredictable user adjustments and potentially incorrect power settings.

Thus, there are major differences in physical features between the prior art of Krall and applicant's claimed invention. Krall teaches attaching his assembly at a host device's existing DC power input receptacle, which approach gives rise to numerous problems associated with that connector interface having no bi-directional access to the device's internal rechargeable battery. The major problems discussed are summarized in the following table:

Problem	Krall's Method	Applicant's Method
User has to transport multiple batteries and power-conversion adapters	User transports awkward and heavy briefcase-size battery and at least one power-conversion adapter	User transports one compact universal power-conversion adapter. In embedded modality, user transports no peripheral items at all
External battery power source requires recharging	Power-conversion adapter must be substantial	No external battery required
Host device's internal battery requires recharging	Valuable external battery resources unnecessarily depleted by mandatory charging of host device's internal battery, resulting in shortened external battery run time	Applicant's claimed invention can eliminate charging host device's battery, if desired.
Information about host device's input voltage requirements desirable in configuring output power signals	User must know host device's power requirements and adjust manually-variable potentiometer accordingly, or user must manipulate VOM to acquire voltage, then manually manipulate potentiometer	By directly accessing battery-to-device I/O connector, unit automatically acquires battery voltage and auto-configures correct device voltage without any user participation

As is now obvious by this comparison of Krall's external long-run battery's operating environment, as compared to that of applicant's claimed invention, applicant's method relies on physical features uniquely different from those taught by Krall. Further, the results achieved by applicant's methods are by comparison, superior to the cited prior art's.

Applicant's Claims Terminology As Applied To Krall's Invention

Turning to the specific language of the subject claims 52 and 78, the following discussion of the terminology of those claims, as they allegedly read on Krall, will show that there are even further differences in physical features that distinguish the novelty of applicant's claimed invention over the prior art.

The Office Action specifically alleges that Krall discloses "a method and a computer readable medium for supplying power to a powered device which is adapted to receive power selectably from a battery and a configurable power supply, comprising:"

Applicant's preamble in the subject claims, as quoted above in the Office Action, recites several terms that, in and of themselves or their equivalents, define differences between Krall's invention and applicant's claims. In particular:

- The prior art does not teach "a powered device which is adapted to receive power" [applicant's emphasis]. There is no indication in Krall's description or drawings that any adapting (modifying, etc.) of the host device to which his apparatus delivers power. Instead, he recites: "It is a more specific object of the present invention to provide *a power supply that is adaptable* [applicant's emphasis] for use with a wide variety of types of portable electronic equipment and various types of power sources"(Col. 1, lines 56-59). Applicant's subject claims recite a contrarian approach by adapting a host

device, and achieves superior results thereby, such as selectably accessing either the device's battery or its device, which is the underlying principle of operation in applicant's claims 52 and 78.

Krall actually goes to extreme (and often impractical) measures to seemingly avoid any adaptation of his powered device element. For example, his invention delivers a proper voltage by: "The variable resistor 73 is adjusted by the user to provide the proper voltage at the output terminals 31 for the electronic device that is connected to the output" (Col. 7, lines 26-29).

Further, the prior art teaches an even less-practical approach to adjusting the output-power signal of the apparatus: "As an alternative to the fully automated circuit of FIG. 7, a measurement of the voltage and polarity of the battery 109 may more simply be displayed to the user who then, in response, manually makes the voltage and polarity adjustments. In this variation, the controller 91 and switching circuit 93 are eliminated. They are replaced by a voltmeter that is connectable across the output terminals 31 through a momentary contact switch that also simultaneously disconnects the terminals 31 from the rest of the power supply circuit. The circuit of the resistor 71 and the potentiometer 73 (FIG. 1) are retained so that the user may adjust the potentiometer 73 in response to the voltmeter reading. The polarity of the connection of the device 107 to the power supply output terminals 31 is controlled by manually reversing the contacts." (Col. 8, lines 35-50).

Applicant also recites a modality of the claimed invention that provides a user with a manually-selectable voltage dial. However, this unit does not share Krall's risky method of trusting a user to make the correct voltage choice. Instead, applicant's manually-selectable version has "sufficient hardware and software from a power box 400 (Fig. 2B) incorporated so that a user receives a visual indicator -- such as an LED -- to indicate that a correct voltage has been matched on a voltage-indicator dial (see Fig. 13)" (Page 7, lines 25-28).

Applicant's manual version is closely akin to the fully-automatic modality, in that the manually-selectable apparatus already knows the appropriate input voltage requirement of the host device, and "Software 800 in Fig. 1A comprises a method of verifying a manually-set output voltage. . . by acquiring and calculating battery output voltage. Power supply device 400 in Fig. 13 and 13A includes an LED 402 that is capable of blinking, and also holding a continuous LED ON condition. When V_{out} and V_{out}^2 are the same, LED 402 goes from a blinking state to a continuous ON state. A continuously ON LED 402 indicates to a user that an accurate voltage match has occurred. This eliminates any mismatched voltage from a power supply 400 which could damage a powered device. With this LED confirmation, a power supply 400 need not have any voltage values demarcated on manually-adjustable voltage selector 337. It is not necessary that a user know what the actual voltage values of a selector 337 are, but user only needs to know that power supply 400 is in a voltage-matched state, irrespective of that actual voltage. Visually defining voltages does, however, offer a psychological advantage, for users who are conversant with voltage matching" (Page 16, lines 4-15). Thus, although there are superficial similarities (only a manually-rotatable selector element) between Krall's apparatus and applicant's, the similarities extend no further, because applicant's adapter unit employs the auto-configuring hardware and software used in all other modalities, which results in far superior performance by eliminating the risks normally associated with letting a user select or adjust anything.

As previously discussed relating to Sketch A herein, Krall is forced to rely on such unreliable user participations because his invention is limited to accessing a non-adapted (unmodified) powered device through a device's existing ". . . low voltage DC power input receptacle," and Krall also acknowledges that ". . . Any internal rechargeable battery is charged by supplying power through the same input receptacle." (Col. 1, lines 31-33).

The problems and limitations of the prior art's apparatus interfacing at this receptacle are pivotal to understanding the novelty and unobviousness of applicant's claimed invention, and its superiority over the cited prior art, so are presented as follows in more detail:

Krall's Interface-Related Problems

The primary problems and limitations in attaching an external source of power to a battery-powered device at Krall's power-input receptacle are:

1. Krall Cannot Access Device Power Requirements

The flow of power signal at a device's power-input receptacle is unidirectional -- *input* only. There is no power signal being output from a non-adapted host device's existing power-input receptacle, therefore, Krall has no access to power-related information about the device available at this connector interface.¹ Host devices of the type described by Krall ("notebook computers, electronic organizers, sophisticated calculators. . . , video cameras and other video equipment. . . telecommunications products, such as telephones, telefax machines. . . , and other types of portable electronic equipment, including radios, television sets and the like"(Col. 1, lines 18-25) all have internal circuitry between the power-input receptacle and the device's internal battery.

Sketch A above illustrates that along the electrical path between the prior

¹ Others, such as Castleman (US Patent #5,570,002) who adapts a host device by introducing a chip into the device receptacle's circuit, have had no success because there is no practical way to update the millions of legacy devices already in the marketplace. By applicant adaptation being in host device's removeable/replaceable battery packs, older devices are easily updated by simply replacing the battery pack.

art's power-input receptacle and the device's battery cells are at least one voltage regulator. Typically multiple regulators parse the receptacle's input voltage into different voltages for processors, storage devices, peripheral ports, screen displays, etc. In the simplistic example in Sketch A, a battery charger is also shown, because Krall recites a host device so configured (Col. 1, lines 30-33, and Col. 4, lines 9-15). As will be discussed later, Krall erroneously teaches that his apparatus in Fig. 7 represents "The modified output circuit of FIG. 7 is capable of automatically adjusting the polarity and voltage at the output terminals 31 for a class of electronic devices, such as a device 107, that includes an internal battery 109 connected across power input terminals 111" (Col. 8, lines 6-10). In more complex host devices (i.e., those Krall enumerates, including notebook computers, electronic organizers, sophisticated calculators, video cameras and other video equipment, telephones, telefax machines, radios, television sets and the like" (Col. 1, lines 18-25). It is reasonable to expect that there likely are also battery monitoring hardware, hold-up capacitors, keyboard controllers, bridge batteries, and a myriad of other electrical elements that preclude any external peripheral, such as Krall's apparatus attached to a device's power-input receptacle, from accessing a device's internal battery for information about a device's power requirements. For simplicity, Sketch A does not show all of these elements interposed between Krall's input-power receptacle and the host device's internal battery.

Unlike the prior art, applicant's claimed invention does acquire power-related information about a host device's power requirements. Applicant has forged a new path to solve this problem that those skilled in the art assumed previously insoluble, by adapting the host device with a new connector interface that creates an electrical path directly to the adapted device's internal battery. As Sketch A herein and applicant's Figs. 6-6F-1

show, applicant's new connector interface typically resides within a device's battery housing ("The internal wiring of battery pack 134 has been reconfigured to include a connector interface. . ." (Page 36, lines 13-14).

This interface is truly bi-directional, enabling applicant's fully-configurable external power supply to sample battery cell voltages, and apply resistive loads to those cells, in order to thereby determine the actual operating voltages of a host device. As applicant's Specification recites:

"The conductive path created by the insertion of male plug 132 flows from battery cell(s) 182 along the first conductor 184, to spring contact 176, where the electrical signal is transferred to male plug 132's conductor 202 (as shown in Fig. 6A) then on to an external power source.

"From battery cell(s) 182, a second electrical path is along conductor 188, then continuing along conductor 18A, where the electrical signal is transferred to male plug 132's conductor 206 (see Fig. 6A), then on to an external power source.

"The direction of electrical flow along the paths described above is from the battery cell(s) 182 to the external power source. This allows software 101 and 800 (Figs. 1 and 1A) in the external power source (or a separate device) to acquire power-related information, such as a voltage of battery cell(s) 182. . . Software 100 and 800 (Figs. 1 and 1A respectively) use the acquired information on voltage (and current if indicated) to configure an external power supply. . . Once power supply 122 in Fig. 2 has been configured to a voltage that correlates to that of battery cell(s) 182. . . When battery pack connector 194 is mated to connector 196 of "system"

(i.e., powered device 136), a power signal from the power source flows into powered device 136" (Pages 37-38).

2. Krall's Invention Is Energy Inefficient

Another problem and limitation in attaching Krall's external apparatus to a non-adapted device is that the manufacturer's input-voltage requirement at the Krall's power-input receptacle is invariably higher than the input-voltage requirement at the battery-to-device connector accessed by applicant's device adaptation of a new connector interface (see Sketch A). Device manufacturers specify high input voltages for purposes of electrical efficiency (thinner circuit-board traces, for example), as well as for driving the device's internal battery charging circuitry with a significant enough voltage to charge the battery cells. As recited in applicant's Specification: "A powered device's battery port typically does not accept the same voltage as would the power adapter input jack located elsewhere on the powered device. A powered device that operates on a 12 VDC battery will typically require a higher voltage at its external power port. This is usually dictated by the need to charge the battery pack from a power source that delivers a higher voltage than the battery, itself" (Page 35, lines 19-34).

In the fast-advancing technology of mobile-device power delivery, the prior art is ancient. This is especially apparent in his teachings about device input voltages. Krall describes his external battery as having "six 2-volt lead acid batteries are connected in series to provide a 12-volt battery supply" (Col. 3, lines 49-50). Based on a survey of laptop manufacturers undertaken by the AEEC (Airline Electronic Engineering Committee) and presented as a White Paper to the Cabin Equipment Interfaces (CEI) Subcommittee in 20 January 1998, the data in the chart "Laptop Voltage Boost vs. Buck Comparison" in attached "Exhibit A" clearly indicates that

Krall's 12-volt power source 11-13 driving his power-output circuit 19 would perform inefficient power conversions in situations where device's require inputs above 19 volts. Also, higher output voltages translate to greater power consumption from battery power sources like Krall's, which results in reduced battery run times.

More importantly, the companion chart "Laptop Wattage Increases Over Time" in attached "Exhibit B" reveal that Krall's use of 5-ampere batteries as his invention's primary source of power was a very poor choice even in 1997, the year of his patent's issue. These matters are pointed out here to emphasize that Krall's invention, in light of such a fast-accelerated field as power for battery-operated devices, is ancient, and therefore weak, and should be construed narrowly.

*3. Krall Fails To Consider Inefficiencies From
Recharging A Device's Internal Battery*

As previously cited, the prior art's non-adapted host device includes a charger for recharging the device's internal battery (Col. 4, lines 9-14). What Krall fails to take into account is:

- Laptops and other battery-powered devices are designed to prioritize battery charging. Once external power is available at non-adapted device's power-input receptacle, the device's internal charging circuit immediately activates, whether the battery needs charging or not. If the battery is fully charged, the internal charger remains active for only a brief period of time. But, if the host device's battery needs recharging, the device will allocate 20-60% of the available input power to recharging its internal battery.

- In a real-world user scenario, it is not unrealistic to expect a user to first drain the device's internal battery, and only then resort to Krall's external power. This scenario is somewhat obvious because the user would not have to deploy the bulky briefcase (or wrist rest pad) when using smaller handheld-class devices such as mobile phones, calculators, video cameras, or the electronic organizers recited in the prior art (Col. 1, lines 18-25). Also, users might likely eschew Krall's briefcase with larger mobile devices, such as notebook computers, when in use at on-the-road locations such as restaurants/diners, in cabs, while roaming the floor of a tradeshow, etc.

In situations in which a user has significantly depleted a host device's internal battery's capacity, attaching Krall's apparatus to a non-adapted device's input-voltage receptacle immediately initiates charging of the device's internal battery, resulting in significant drain of capacity at the apparatus' external battery cells 11-13. Essentially, Krall's system operates by inefficiently replacing capacity in a host device's battery by depleting capacity in his external battery 11-13. Given the further loss of cell capacity resulting from the previously discussed inefficient power-conversion, the additional battery capacity losses (up to 60%) attributed to recharging the host device's internal battery, the net result is that the prior art's extended run-time battery performs poorly because of these energy inefficiencies.

To put this into quantifiable terms, the prior art teaches that battery source 11-13 is capacity-rated at 5 amps. Assuming that the power-conversion efficiency of Krall's output circuit 19 is 80%² (typical for

² Based on a voltage conversion from 12 volts at Krall's battery source to 20 volts at the output. The 20-volt number is used here to be consistent with the input-voltage requirement of an IBM 755Cs laptop referenced later.

such circuits circa 1997), and that the device's internal battery charging process requires 60% of the power available at the non-adapted device's power-input receptacle, the following calculation is used:

5 amps x 20% loss for power conversion = 1 amp loss

5 amps - 1 amp = 4 amps remaining

4 amps x 60% loss for device battery charging = 2.4 amps loss

4 amps - 2.4 amps = 1.6 amps remaining

Thus, Krall's 5 amp extended run time battery's capacity is reduced to only 1.6 amps (33%) available for powering the host device.

To put these calculations into practice, the previously-referenced IBM 755Cs laptop (circa 1994, the year that Krall's patent application was filed) indicates its input power parameters to be 20 V @ 2.5A. Using the above calculations, 60% of the current requirement is here deducted for battery charging (1.5 amp), leaving 1.0 amp as the current requirement for powering the laptop's system itself.³ Thus, at least mathematically, a user of Krall's battery source for powering an IBM 755Cs might expect no more than 1 to 1.5 hours of continuous device operation from his extended run-time battery source.

By comparison, applicant's configurable power supply delivers its power to an adapted host device at its battery-to-device connector that resides in the battery bay (see Sketch A). Because the host device is so adapted, it operates at much lower input voltages when power is delivered to applicant's battery connector interface than the higher voltages required when power is delivered to Krall's power-input

³ IBM's external AC/DC power supply for the 755Cs is labeled to deliver 2.0-3.38A, so the calculated 1.0 amps used in this example may actually be considerably too conservative for determining how long this laptop would operate properly on Krall's extended run-time battery.

receptacle. As recited in the section titled "Adapter Voltages Don't Match Battery Pack Voltages" in applicant's Specification (pages 35-36), "...connecting a 12-volt adapter (that matches a battery pack's voltage) to the external power port on a host device may likely deliver a voltage that is insufficient to properly power a device."

The advantages of applicant's adapted device extend to power consumption. As Sketch A indicates, devices operating under battery power utilize different internal voltage regulators. This may or may not be in conjunction with the voltage regulators associated with the device's power-input receptacle but, by and large, device's running under battery power run under either/both hardware and software power management in order to optimize system performance and run time. Thus, a power supply, whether applicant's or Krall's extended run-time battery, benefits from delivering power through that device's battery connector, as compared to delivering the same power through the prior art's power-input receptacle.

The calculations for the prior art's 5 amp battery, which now delivers its power through the battery connector interface of applicant's adapted device, instead of through Krall's power-input receptacle, now produce the following superior power efficiency results:

$$5 \text{ amps} \times 15\%^4 \text{ loss for power conversion} = 0.75 \text{ amp loss}$$

$$5 \text{ amps} - 0.75 \text{ amp} = 4.25 \text{ amps remaining}$$

$$4.25 \text{ amps} \times 0\% \text{ loss for device battery charging} = 0.0 \text{ amp loss}$$

$$4.25 \text{ amps} - 0 \text{ amps} = 4.25 \text{ amps remaining}$$

⁴ Power-conversion efficiency has been adjusted upward because the IBM 755Cs being used in this example operates with a battery output voltage label-rated at 9.6VDC. For purposes of these calculations, applicant here uses 12-volts as the actual input voltage being delivered top the device-to-battery connector shown in Sketch A.

Thus, Krall's 5 amp extended run time battery's capacity is only reduced to 4.25 amps when powering applicant's adapted device, compared to 1.6 amps when powering the prior art's non-adapted device. Instead of Krall having only 33% of battery capacity for operating the device, applicant's adapted-device method results in 85% battery capacity available.

Further, by combining Krall's power apparatus with the new connector interface of applicant's adapted device, a reasonable case can be made for the prior art's battery 11-13 achieving actual host device run-time performance beyond the above-calculated 85% capacity figure. The device's hardware/software power management capabilities, which were not included in the above calculation, would contribute to further extending actual battery run time. Thus, for the IBM 755Cs laptop used here an example and using the calculation's 1.0 amp current requirement for powering the laptop's system itself, Krall's battery source delivering its power through applicant's connector interface provides a user at least 4 hours of continuous device operation (and perhaps as much as 5 hours if power management is factored in). This compared favorably to the mere 1 to 1.5 hours when Krall's battery source is attached to a non-adapted device's power-input receptacle.

By delivering power more efficiently at the device's battery-to-device connector, applicant's claimed invention achieves results superior to Krall's in power efficiency, especially by eliminating the excessive power required to charge a device's internal battery. There's even a bonus fringe benefit of increased performance for host devices that have battery power management capabilities. These advantages

have, up to now, not been appreciated by those skilled in the art of external power peripherals, although it is inherent in the design and operation of every device that is designed to accept power selectably from either its battery or an attachable power supply.

4. Krall Fails To Address Input-Voltage Tolerances

Applicant's claimed invention further distinguishes itself and shows its superiority over the prior art by solving another problem and limitation of Krall. The prior art does not teach an adjusting of his apparatus' power output circuit 19 (Figs 1 and 7) to deliver a voltage that complies with a host device's specified voltage-input tolerances. Again referencing the laptop device survey presented in the above-cited AEEC/CEI White Paper, the chart labeled "Laptop Voltage-Error Tolerance" in "Exhibit B," details device manufacturers' requirements on allowable variance in device-input voltage. As the chart data shows, allowable input-voltage tolerances at a laptop's power-input receptacle is often amazingly stringent, with one manufacturer (IBM) requiring a zero-voltage tolerance, and eight other manufacturers requiring voltage tolerances of 1-volt or less. Krall's Description makes no reference whatsoever to this issue.

Krall's user-adjustable potentiometer 73 (Col. 5, lines 10-16), which determines the output circuit 19's voltage (Fig 1), or his microprocessor 91 (Fig. 7), need to be designed as sophisticated precision elements. Costly precision resistors might be one approach to ensuring that the apparatus' user-adjustable output-voltage is within a device manufacturer's voltage-tolerance specification.

Another negative factor in the prior art's failure in address non-adapted

device's input-voltage tolerances is that host-device input voltages change dramatically from year to year, and even from model to model in a given year (reference the "Laptop Models By Voltage (1994-1997)" chart in "Exhibit A"). This requires continual and costly updates and modifications to the prior art's potentiometer 73's (Fig. 1) resistive values as new models of host devices are released into the marketplace. The magnitude of such impractical upgrades is apparent in the litany of device classes Krall teaches his apparatus can allegedly adapt to "*notebook computers, electronic organizers, sophisticated calculators, video cameras and other video equipment, telecommunications products, such as telephones, telefax machines, radios, television sets,*" etc. (Col. 1, lines 18-25).

For the prior art's alternate modality that allegedly provides "automatic configuration" of power output circuit 19 (Fig. 7) (Col. 2, lines 45-50), in the context of continual updates to ensure compatibility with an ever-expanding number of new host devices, is so monumental a task as to render Krall's invention inoperative. To put this into some real-world perspective, evidence the extensive six-page list of unique, device-specific power-conversion adapters offered by iGo, a mail order vendor of such peripheral devices ("Exhibit C"). This list is by no means comprehensive, as it does not list all brands of laptops, and it only covers the notebook computer class in Krall's extensive litany of devices his apparatus supposedly can power. It is clearly evident that Krall's assertion that "It is a more specific object of the present invention to provide a power supply that is adaptable for use with a wide variety of types of portable electronic equipment, and various types of power sources" (Col. 1, lines 56-59) is unachievable with the rudimentary apparatuses taught in his Figures and Description.

Comparing Krall's voltage-tolerance problem by using a non-adapted device's existing power-input receptacle with applicant's use of an adapted device's battery connector interface, the input voltage tolerances at a device's battery-to-device connector is amazingly broad. The input voltage range runs the gamut from the device's "shut-down" voltage (the minimum battery voltage threshold that operates the device), to the maximum voltage output by a battery (here considered the design voltage).⁵ In an example cited in applicant's Specification, under the heading "Vmin and Vmin" (pages 109-113) a typical 10-cell Ni-Cad pack has a minimum output voltage of 10.0VDC, and a maximum output voltage of 15.0VDC. Thus, applicant's configurable power supply attached to an adapted device's battery-to-device connector can output any voltage in this 5-volt tolerance range whereas, because it is attached to the device's power-input receptacle, while Krall's output circuit 19 would be subject to the device manufacturer's voltage-error tolerance requirement. As the "Laptop Voltage-Error Tolerance" chart in "Exhibit B" clearly shows, the only totally safe voltage-error tolerance that Krall can rely on is a *zero-voltage error*.

5. Krall Relies On Unpredictable User Skills and Know-How

Attaching Krall's external source of power to a non-adapted device's power-input receptacle results in another problem/limitation, in that a host device's input-voltage requirements are usually either unknown to a user or, if available, likely confusing. Often the device's power-input requirements are not clearly identified on the label of the device.

Instead, the manufacturer provides this information on label of the external AC/DC (or DC/DC) power-conversion adapter. Unfortunately for Krall, these labeled adapters are the peripheral devices which his invention is supposed to eliminate. As the prior art's Description asserts as the advantage of his invention:

"Since there is very little standardization of battery and power supply requirements, it becomes very inconvenient when a user is carrying more than one piece of equipment at a time. Each such piece of equipment can require its own special type of battery or battery pack and/or external operating or recharging power supply. It can be very awkward to have to carry separate battery packs and/or power supplies for each of several pieces of portable electronic equipment. Further, if the user desires to be able to operate or recharge each of several pieces of equipment from more than one source, such as from both AC house current and a car battery, for example, it may be necessary for the user to carry two or more separate power supplies and/or types of interconnecting cables for each piece of equipment. There is very little standardization in both the electrical and mechanical (types of plugs, etc.) interfaces with external power supplies.

"Therefore, it is a primary object of the present invention to provide an external power supply for such equipment that overcomes these disadvantages to the user" (Col. 1, lines 54-56).

By allegedly inventing an external one-size-fits-all power source, the use of Krall's invention causes a user to not have the device's original

⁵ In reality, the upper voltage limit can be the anticipated "spike" voltage, which can be 50% above the design voltage, but a given host device may be able to tolerate such voltage spikes only transiently, thus rendering these voltage values as risky to use for continuous operations.

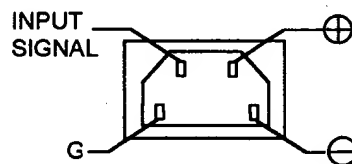
external power supply available which, ironically, is the one item that would likely have label information about the device's input power requirements!

Also, labeling on a device can be confusing to an unskilled user. For example, the device labeling on the IBM 755Cs laptop reads:

20V ----- 2.50A

However, IBM's supplied external power-conversion adapter is labeled with the following:

OUTPUT 20-10V -----
2.00-3.38A



Unless Krall's expected typical user understands the pictogram on the label of IBM's power-conversion adapter, which explains why the external adapter output is indicated as "20-10V," there is considerable risk to Krall's teaching that: "The variable resistor 73 is adjusted by the user to provide the proper voltage at the output terminals 31 for the electronic device that is connected to the output" (Col. 7, lines 25-28).

Krall does recite a modality whereby he alleges that his power-output circuit 19 in Fig. 7 ". . . is capable of automatically adjusting the polarity and voltage at the output terminals 31 for a class of electronic devices, such as a device 107, that includes an internal battery 109

connected across power input terminals 111" (Col. 8, lines 6-10). As has already been pointed out in the section above titled "Krall Cannot Access Device Power Requirements," the prior art is flawed by its erroneous teaching that such a class of electronic devices that includes a battery connected across power input terminals 111 could exist. Note that the prior art does not anticipate applicant's claimed invention, because applicant's internal battery is connected across the device's battery-to-device connector, not Krall's "power input terminals 111." Also, previously discussed in the section above titled "Krall Fails To Address Input-Voltage Tolerances," Krall's power-output circuit 19 (Fig. 7) is further flawed because, even if such a class of devices as Krall hypothesizes does come to exist, the battery voltage acquired could not be analyzed in any way to determine the far-different voltage required at his device's power input terminals 111, nor could such acquired battery information be used to determine the input-voltage tolerance as specified by the device's manufacturer. Applicant's subject claims recite an apparatus (and method) for acquiring battery data, then the apparatus outputs its configured power signal to the device's battery-to-device connector. This is described in applicant's Specification as:

"A powered device's battery port typically does not accept the same voltage as would the power adapter input jack located elsewhere on the powered device" (Page 35). Therefore, "Users are connecting an external power system to a powered device at its battery I/O, and not to the usual power input port. . . ." (Page 35) "This allows software 101 and 800 (Figs. 1 and 1A) in the external power source (or a separate device) to acquire power-related information, such as a voltage of battery cell(s) 182. Software 101 and 800 use both a Vmin voltage (under load), and a Vmax (no

load). A suitable resistive load is applied in the external power supply to allow a V_{min} voltage reading. . . Software 100 and 800 (Figs. 1 and 1A respectively) use the acquired information on voltage (and current if indicated) to configure an external power supply. . . " (Page 37).

As depicted in Sketch A, applicant's device is adapted by the introduction of a new connector interface, which results in the program instructions recited in the preamble of the subject claims having selectable access to a device adapted so as to provide access to the device's internal battery. The accessing is for acquiring battery voltage data and for applying resistive loads to the battery. As applicant's Specification recites on page 62:

" Software 101 in Fig. 1 acquires a battery's voltage in several modes. ' V_{max} ' 658 is the no-load voltage of a battery, while ' V_{min} ' 680 is the under-load voltage of a battery. Software 101 can be programmed to look at either or both V_{max} or V_{min} values, but it must acquire at least one. The selection of V_{max} or V_{min} is typically not essential. A powered device with a battery source is designed to accept a V_{max} voltage, since all batteries have an initial 'pulse' voltage which can be a substantially higher voltage spike than a continuous V_{max} . Therefore, matching V_{max} [as an appropriate output voltage] is typically acceptable, if only one voltage parameter is to be acquired.

" V_{min} , the under-load voltage value of a battery, is acquired in certain applications. The significance of V_{min} is that it may, under

certain conditions, also be a viable voltage parameter for an external power supply to match or to use as a basis of a calculation."

Upon analyzing the acquired battery data, the program instructions further determine a battery voltage that is appropriate for the output of an automatically configurable power supply that delivers the configured power signal to the device's battery connector, via applicant's new connector interface. No user adjusting or configuring is required, and Krall's allegedly "automatic" modality does not anticipate applicant's method.

6. *Krall's Acquired Battery-Voltage Information Does Not Enable His Invention To Provide Applicant's Automatic Output Voltage Configuration Power Supply Capabilities*

The prior art recites a modality of the invention that is "capable of automatically adjusting the polarity and voltage at the output terminals 31 for a class of electronic devices, such as a device 107, that includes an internal battery 109 connected across power input terminals 111." (Col. 8, lines 6-10). This reference to a "class of electronic devices" is very vague, and Krall proffers no examples or other substantiation of what such devices specifically are. But, even should such devices actually exist, Krall continues to teach his apparatus' power-output circuit 19 attaching to a non-adapted device's input terminals 111. The prior art's apparatus -- configured as in Krall's Fig. 7 and as taught in his Description, -- is inoperative, because:

- As has been shown, battery output voltages do not correspond with device manufacturers' input-voltage requirements at Krall's

designated input-power receptacle 111. Based on battery chemistry and the way a charging process works, the input voltage at a device's power-input receptacle must be higher than the measured voltage of the battery cells to be charged. Ironically Krall, himself, confirms this non-correlation in discussing the process of charging his apparatus' internal battery cells 11-13: "For a 12-volt battery system, in a specific example, the charging voltage is set for about 15 volts" (Col. 6, lines 11-13).

Applicant has previously cited herein an example of an IBM 755Cs laptop computer with a battery output of 9.6VDC, yet this laptop requires 20VDC at its power-input receptacle. Krall is flawed by teaching that his circuit in Fig. 7 acquires a device's battery-output voltage, thereby enabling his apparatus for "automatically adjusting the. . . voltage at the output terminals" (Col. 8, lines 7-8). This flaw renders this modality of the prior art inoperative.

By comparison, applicant's claimed invention breaks new ground by acquiring voltage information from an adapted device's battery at the existing battery-to-device connector, then the apparatus accesses that same I/O for delivering power to a host device. Applicant's claimed invention is superior to Krall's, because it successfully solves Krall's non-correlating voltages flaw, and because applicant recites a physical feature distinct from Krall teaching (i.e., a device adapted with a new battery connector interface) the Office Action's objection under 35 USC §102 is thereby overcome.

- Applicant has already herein substantiated that a significant

number of device manufacturers⁶ require very precise input voltage tolerances, often +/-1 volt. Even if the power-output circuit 19 (Fig. 7) of the subject prior art could glean information about a device's battery, Krall's invention would still not operate, because the prior art fails to teach a solution to the issue of delivering an output signal at a voltage that complies with each device manufacturer's input-voltage error tolerance. Nowhere in the prior art's Description is this issue even acknowledged, and the only referential indication by Krall is his casual approach to voltage tolerances for battery charging, where he states that the output voltage for his charger circuit 17 when charging a 12-volt battery is set "for about" 15 volts (Col. 6, line 12).

Applicant's claimed invention, by comparison, totally avoids any such critical input-voltage parameters by delivering its power signal at an adapted devices battery-to-device interface. As previously discussed, the voltage regulators and other device circuitry downstream of the battery interface of the device are typically designed to operate across the wide voltage ranges that all batteries output. The previous example of a host device equipped with a 10-cell Ni-Cad pack shows that the device will operate with voltages input at its battery-to-device connector in a range between a minimum of 10.0VDC, to a maximum of 15.0VDC (Pages 104-107).

Thus, applicant's apparatus, as recited in the subject claims, uses a new principle of operation in adapting an existing battery-to-device connector of a host device to selectably access a battery and a configurable power supply. In doing so, when delivering power

⁶ The AEEC White Paper data is from a survey of 16 laptop manufacturers (80% responded).

from its configured power supply, applicant's apparatus overcomes the prior art's deficiency of not being able to output a voltage to a device that is compliant with each device-manufacturer's input-voltage tolerance requirements.

Based on all of the above, it is obvious that Krall teaches a flawed method of delivering power, which is based on apparent misconceptions about how his non-adapted host device's are designed, and their power-input requirements. Principally, the prior art's most serious flaw is its reliance on the device's existing input-power receptacle through which to deliver power. This interface is fraught with complexities, problems and, especially with Krall's allegedly "automatically adjusting" power-output circuit 19 (Fig. 7), the prior art's use of a device's input-power receptacle 111 results in an inoperative device. Applicant's subject claims teach a device adapted by a new connector interface that not only overcomes the prior art's limitations, but also provides superior result of a power-delivery apparatus that saves designers and manufacturers R&D costs and time by eliminating the need to research and test compliance with the power-input requirements of virtually every possible host device to which a user might attach Krall's apparatus.

Detailed Discussion Of The Office Action's Cited Objections

Applicant's second area of reasoned argument addresses the terms used in the subject claims 52 and 78 that do not read on Krall, and thus clearly differentiate the two. Throughout this section, the prior art references are construed narrowly because, as has already been shown, they are often vague or weak, and are also very old.

1. Applicant's Device is Adapted; Krall's Isn't

In the previous section, a comparative overview of the operating environments of the two apparatuses pointed out again and again that the paramount differentiator was that Krall's extended run-time battery/user-adjustable regulator supplies power to a *non-adapted* host device, while the preamble of applicant's claims recites "...supplying power to a powered device which is *adapted* to receive power. . . ." [applicant's emphasis]

Beyond Krall's previously cited uses of the word "adapt," his other uses of this term (or reasonable equivalents) bear out that he never recites an adapted device:

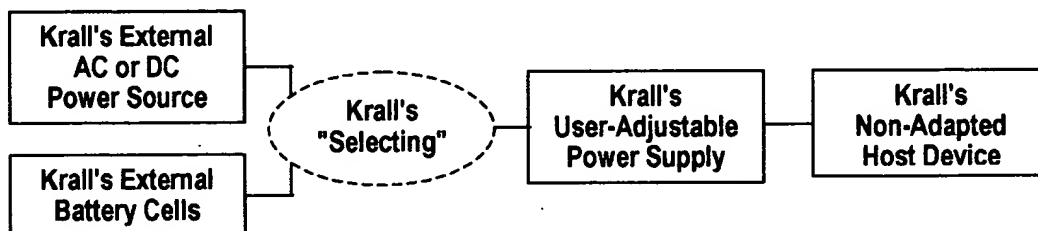
- "The input circuit is *adapted* to charge the internal battery of the power supply from a variety of input sources of various voltages, both AC and DC, and, in the case of a DC supply, being independent of its polarity" [applicant's emphasis] (Col. 2, lines 13-16).
- "FIG. 7 shows an alternative output circuit for the power supply of FIG. 1 wherein its output voltage and polarity are automatically *adapted* to that of the equipment to which it is attached" [applicant's emphasis] (Col. 3, lines 13-16)
- "An enclosure 113 is *adapted* to hold the thin, flat batteries 11-13. . . ." [applicant's emphasis] (Col. 8, lines 52-53)
- "lithium ion batteries. . . can be substituted, provided that the charging portion 17 (FIG. 1) of the system is *adapted* to its unique characteristics" [applicant's emphasis] (Col. 10, lines 25-29).

*2. Applicant's Unique Device Adaptation Further Differentiates
The Subject Claims From Krall's Invention*

The preamble of Applicant's claims 52 and 78 further differentiate the subject claimed invention from Krall. The claims clearly define "a powered device which is adapted to receive power selectably from a battery and a configurable power supply. . ." [applicant's emphasis]. The specificity of what a host device's adaptation is for is clearly spelled out. The adaptation is to enable a device to receive power from either a battery or a configurable power supply, of which each of the two sources of power is *selectable*.

Therefore, according to the preamble of the subject claims, any selecting of power sources -- battery, or power supply -- must occur at the adapted powered device. Applicant's Specification and drawings then clearly define the adaptation at the host device. . .it is a new connector interface that, by an insertion/retraction of a connector plug (see Figs. 6E-6F-1 and page 95 of the Specification, which "define a non-limiting means of configuring the circuit within a battery 508B with a diode, so that there is only one position for a connector 132."). Or, in another modality, a user performs a sequence of inserting/retracting/rotating/reinserting a connector plug (see Figs. 6B-6C and pages 36-38 of the Specification). Either manipulation of the connector plug causes either the battery or power supply to selectively deliver power to the device. By comparison, Krall's selecting occurs not at a host device, but at his external apparatus. The prior art teaches an that "object of the present invention [is] to provide a power supply that is adaptable for. . .various types of power sources" (Col. 1, lines 52-56). This power sources are identified as a battery 11-13, and "a variety of input sources of various voltages, both AC and DC" (Col. 2, lines 14-15).

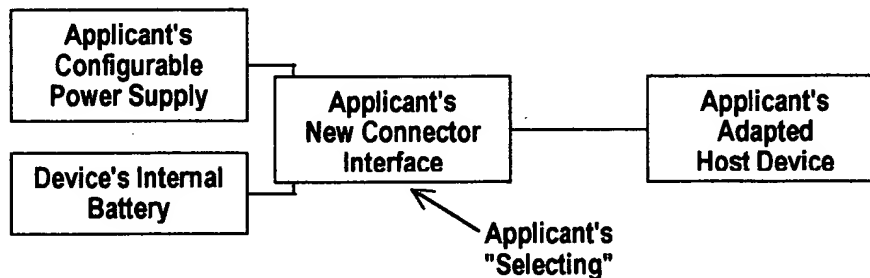
Krall's invention can only be viewed as teaching a host device receiving power from only a power supply, as Sketch B clearly illustrates:

Sketch B

Krall's host device always receives power from his power supply (i.e., power-output circuit 19), and never directly from a battery 11-13, per se. Applicant's subject claims recites a powered device receiving an appropriate voltage "from said configurable power supply, instead of from said battery." Any "selectability" associated with Krall merely addresses whether a user selectably configures Krall's power-output circuit 19 to receive its power from either a battery 11-13, or "input sources of various voltages."

Referencing Krall's Fig. 1, the battery 11-13 as a source of power for his user-adjustable power supply is selected by closing switch 15. To select an alternative source of power, a user attaches either "An external power supply [as] is usually required to interconnect. . . with available AC house current" or "The DC input power will generally be connected with the input terminals 27 through a small transformer and rectifier (not shown) of the type commonly used with portable equipment" (Col. 1, lines 33-35, and Col. 4, lines 49-52).

Sketch C depicts applicant's apparatus, as recited in subject claims 52 and 78:

Sketch C

Applicant recites one modality of a new connector interface which enables the selecting of a battery and a configurable power supply in the section of the

Specification titled "Connector Operations" on pages 36-38. This version of the connector interface is essentially "... a Y-connector [that] has been created, the base of which is comprised of spring contacts 176 and 178. The two branches of this Y-connector — one of which leads to battery cell(s) 182, and the other branch to powered device 136 — are selectable by positioning the conductive side 202 of a male connector 132 to be electrically attached to one branch or the other." Variants of the connector include a multi-contact rotatable plug and receptacle for apparatus configurations that require manipulating a multiplicity of conductors (Fig. 8) and a user-applied version that enables upgrading devices that use individual battery cells in a holder or cavity (Fig. 7).

Most importantly, Krall's invention teaches no selecting whatsoever at a host device. Further, because Krall's apparatus interposes a user-adjustable power supply between his battery 11-13 (Fig. 1) and a host device, so he does not teach applicant's host device adapted for selectably receiving power directly from a battery. Therefore, applicant's preamble of claims 52 and 78 clearly does not read on Krall.

*3. Applicant's Claimed Battery Is Not
The Same As Krall's Battery*

The subject claims recite "preloading said battery with a resistive load." "Said battery" here references the selectable battery recited in the preamble. Based on the discussion above as to applicant's host device that is adapted to receive power by a selecting of either a battery or a configurable power supply, then the specific battery is, by common sense, either internal or external to said device. For the limited purpose of a response to the Office Action's allegation that the subject claims are anticipated by Krall, the following references to batteries in applicant's Specification are cited here to illustrate that "said battery" in the instant claims can only be a device's internal battery:

- "By attaching to a powered device's battery pack, the number of connector variants can be specific to battery connections (see Figs. 6A, 6F-, 7, and 8). Another benefit achieved by powering a powered device 136 through its battery port is that a power assembly 100 can easily identify the correct voltage required by a particular powered device. One method of performing a voltage identification is for MCU 102 to sample -- on powerlines 114 and 166 -- the voltage of a battery 134. MCU 102's software 101 executes a process to acquire, and optimize, what becomes the output voltage requirement for configurable power supply 122. MCU 102 then uses that voltage information, sending a voltage-control signal along line 130B to configurable power supply 122" (Page 4).
- "One circuit is to the batteries comprised of traces 264 and 272, while the opposing contacts 266 and 268 electrically create a circuit to host device 284, so that traces 266 and 268 create a circuit that effectively bypasses cells 288. This allows external power sources, such as a power supply and/or battery charger, to operate either simultaneously or independently, to power a powered device 284, and to charge a battery, both functions being performed on the discrete electrical paths created by a flex-connector 250" (Page 52).
- "The hardware and software of a power box 400 can even be integrated into a battery pack, as indicated in Fig. 10, which would result in either the elimination of any external adapters at all, or in a battery pack providing an LED indicator when the correctly matched adapter is in the circuit" (Page 7).

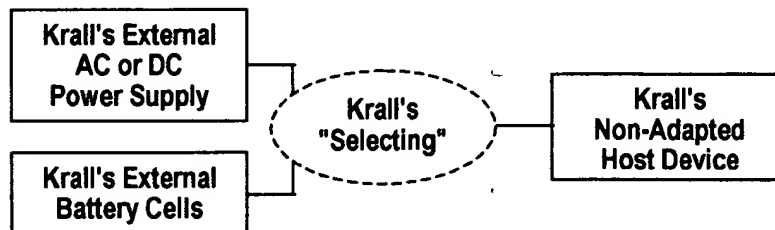
These citations, *a priori*, distinguish applicant's battery in claims 52 and 78 from Krall, who only makes vague references to a host device's internal battery as a source for voltage information in his (as previously discussed, flawed and inoperative) "automatically adjustable" power supply circuit of Fig. 7 (Col. 8,

lines 6-10).

Should one attempt to make a case that applicant's subject claims are to be read so that "said battery" is an external battery, such an interpretation of the claims would still not read on Krall. As discussed in the previous section and its Sketches B and C, Krall's non-adapted host device receives power from his "user-adjustable power supply," and not specifically from his batteries 11-13. The architecture and operational design of Krall's invention require a power supply circuit 19 to be interposed between his battery and a host device, and it is his power supply that is immediately attached to the host device, and not his batteries 11-13. Further, the power signal received by the prior art's non-adapted host device is not of the same voltage as his 12-volt batteries, so it would be straining the reference to allege that Krall's host device is receiving an input-power signal that is the same as (or comparable to) the output-signal of his battery cells 11-13.

Further substantiation that Krall's host device is not receiving power from his battery, per se, is made more obvious by simply viewing Sketch B, which is now modified without his power supply circuit 19 interposed between his battery cells 11-13 and his non-adapted host device, here presented as Sketch D:

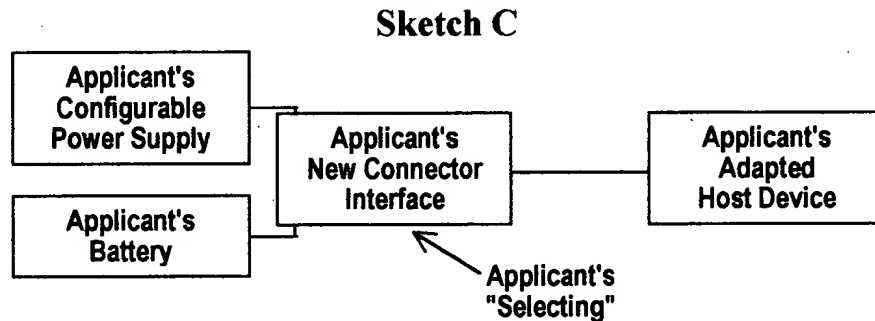
Sketch D



By modifying the original Sketch B by removing Krall's power supply circuit 19, his invention as it now appears in Sketch D becomes inoperative. Although Krall's 12-volt external batteries 11-13 are now attached directly to the power-input receptacle of his non-adapted host device, there is now no element for varying the

battery's output voltage to match the required input voltage of the host device. Thus, it is not the prior art's battery that is selectable to supply power to a non-adapted host device but, instead, Krall teaches a power supply circuit 19 that powers his non-adapted host device. The prior art's battery is only one of three sources of power attachable as power sources at the input-side (upstream) of Krall's output power circuit 19.

Also, Sketch D further supports the above-discussed difference between Krall's external battery and applicant's battery. Sketch D is, by having removed Krall's power supply, nearly an exact representation of applicant's claimed invention in Sketch C.



Note that, because applicant's new connector interface delivers power from an external battery directly to a host device -- via the device's existing battery-to-device connector (see Sketch A) -- the hypothetical apparatus depicted in Sketch C is fully operational, while Krall's comparably configured apparatus in Sketch D is inoperative.

4. Applicant's Claims Result In An Outcome Different Than Krall's

Applicant's claims 52 and 78 recite the outcome of their preambles' "computer readable medium embodying program instructions for supplying power to a powered device" as: "thereby supplying *the appropriate voltage to the powered device* from said configurable power supply, *instead of said battery* [applicant's

emphasis]." Clearly indicated in this statement, especially by the qualifying term "instead of," is that the subject battery has a characteristic of outputting an appropriate voltage for delivering power to the device. The instant claims resolve themselves by reciting a battery that is voltage-compatible with the host device, and a power supply which is now configured to also be voltage-compatible, so that these elements are each interchangeable with the other, i.e., the power supply is so configured to be useable *instead of* the battery for supplying the appropriate battery voltage to the device.

Comparing Krall on this issue, the prior art teaches a battery having a predefined voltage that is based on the battery's compatibility with a battery charging circuit 17. No voltage compatibility with any host device is recited in Krall's Description. Further, as indicated in the preceding section's discussion comparing Sketch D with Sketch C, Krall's power output circuit 19 cannot be used *instead of* his battery 11-13. Krall's teaches (in Figs. 1, 7 and throughout the Description) using his battery *with* -- not *instead of* -- his user-adjustable power supply 19.

Thus, applicant's claims 52 and 78 do not read on Krall's apparatus in any of its modalities, because his power supply is not independently selectable instead of his battery. To deliver power, his power supply must always be in the circuit, while applicant's claims recite a true either/or selectability whereby either a battery, or an automatically-configurable power supply, are selected to power a host device.

Resolving The Office Action's Specific Objections

Applicant's reasoned arguments above have brought forth physical differences between Krall's and applicant's claimed inventions to overcome the Office Action's objections. The differences thus far discussed have addressed the preambles and closing clauses of subject claims 52 and 78. In overcoming the Office Action's specific objections, a major difference that has been pointed out is applicant's reciting an adapted host device, while

Krall's device is non-adapted. Applicant's adaptation of a host device being a new connector interface that accesses the device's battery-to-device connector which enables the device to selectably receive power from a battery or configurable power supply, while Krall's battery does not directly power his non-adapted host device but, instead, his battery merely serves as a source of power for an adjustable power supply that delivers the power to his device's existing power-input receptacle.

Also, previous discussions have successfully resolved comparative issues between Krall and applicant's recitations as related to the subject claims' closing clause, showing that applicant's battery has a characteristic distinct from Krall's, the battery having an output voltage compatible with the input voltage of the host device (thus, referentially indicating that applicant's battery is the device's internal battery). Therefore, as applicant's computer readable medium embodying program instructions automatically configures the power supply, both the battery and power supply output voltages to the powered device that render the power supply and battery electrically interchangeable, so that the power supply supplies the power, instead of the device's battery. Krall, by comparison, teaches only a 12-volt battery source that is obviously neither internal to a device, nor voltage compatible with the device. For this and other reasoned arguments already presented, Krall's invention does not teach applicant's claimed device that receives power from a configured power supply, "*instead of from said battery*" [applicant's emphasis].

In the following section, those clauses in the subject claims that are objected to in the Office Action's specific references to Krall's Description and drawings are discussed:

1. Krall's Resistive Load Does Not Anticipate The Subject Claims

Applicant's claim recites: "preloading said battery with a resistive load" and the Office Action alleges that this clause reads on Krall's element 23 in Fig. 1. The instant resistive load 23 in Fig. 1 is defined in Krall's Description for charging his battery power source 11-13. Krall teaches: "Referring to FIGS. 3A, 3B and 3C,

operation of the input circuit 17 of FIG. 1 to charge the batteries 11-13 will be described. . . The charge voltage control circuit 43 preferably includes a comparator which, by monitoring the voltage drop across the resistor 23 during charging, abruptly changes the control voltage in the line 45 when the charging current to the batteries 11-13 falls to a level $I_{sub.c}$ " (Col. 6, Lines 18-22).

Krall does reference resistive load 23 in a context of delivering power: "The output circuit 19 will now be briefly described. A second DC-to-DC converter integrated circuit chip 65 has an input connected to the node 21 for drawing current from the batteries 11-13 through the series resistance 23. The circuit 65 is also preferably the available part LT1070 described above. An output in a line 67 has a voltage that is selected by a voltage applied to a line 69 from a voltage dividing circuit of a fixed resistance 71 in series with a variable resistance 73. Further, a maximum current draw from the batteries 11-13 is set by a current limiting circuit 75 connected to the chip 65 through a line 77. The variable resistance 73 is preferably in the form of a rotary switch having various fixed resistances connected to it in a manner to allow a step-function incremental increase in the resistance as the switch is rotated in one direction and a similar decrease in resistance as the switch is rotated in the other direction. The values of the resistances are chosen to provide a choice of voltages at the output 31 which correspond to standard battery voltages" (Col. 5, lines 1-19).

Krall's battery only passes its current through the subject resistive load 23, and a separate user-adjustable resistance 73 is employed to determine the output voltage to a host device. Thus, the Office Action's cited reference to resistive load 23 is misunderstood. Krall uses a resistive load 23 in a comparator application of his battery charging circuit and, thus, Krall's resistive element 23 does not anticipate applicant's preloading a battery as a step in a process that results in a determination of an output voltage.

To further show a significant difference between Krall's flawed and applicant's claimed inventions, Krall's variable resistive element 73 is a rotary switch calibrated to output voltages "which correspond to standard battery voltages." As previously discussed in the above-section titled "Krall's Interface-Related Problems," the prior art's apparatus delivers its power output to a host device's existing power-input receptacle. The flaw in Krall's teaching is that device input voltages at this power-input receptacle have no correlation with "standard battery voltages." "Exhibit A" attached hereto shows a chart of "Laptop Models By Voltage (1994-1997)," which represent these devices' required input-voltage. Krall's problem is that the indicated device input-voltages are not representational of "standard battery voltages." During the 1994-'97 period covered by this survey, there were no "standard" laptop battery packs that output voltages of 19-, 20-, or 24-volts. Even more to show the prior art's flawed methods in addressing the operational requirements of laptop devices, the survey chart does not even indicate any laptop whatsoever manufactured over a three year period that would operate from Krall's own "six 2-volt lead acid batteries [that] are connected in series to provide a 12-volt battery supply" (Col. 3, lines 49-50). Again, the evidence points to Krall's invention being flawed and, at least with notebook computers widely available during the time period of Krall's patent prosecution, the distinct reality that Krall's invention was -- and still is -- flawed sufficiently so as to be considered functionally inoperative.

By comparison, applicant's claims 52 and 78 recite a host device adapted to accept its input voltage at its existing battery-to-device connector. This interface does accept device-compliant battery voltages, and these voltages are discoverable by "preloading said battery with a resistive load," as recited in the subject claims. Thus, the objection in the Office Action is overcome by the prior art's apparatus not using a resistive load in a method that leads to determining an output voltage. Instead, a user must adjust a potentiometer to determine Krall's output voltage. By the resistive load of applicant's claimed invention being

applied to a device's battery in order to automatically determine an output voltage, applicant's method is distinctly different than Krall's teachings. This new principle of operation carves a new path for mobile power system designers and manufacturers by providing a simple, user-agnostic method of configuring a power supply for powering virtually any battery-powered device.

2. *The Cited Reference To The Prior Art's*

Varying A Resistive Load Is Misunderstood

The Office Action alleges that Krall's invention anticipates applicant's subject claims, because applicant's "varying said resistive load on said battery" reads on elements 23 and 43 of Krall's Fig. 1, as recited in Col. 6, lines 18-22.

The Office Action's objection to Krall's resistive load element 23 has already been overcome by the reasoned arguments in the previous section. The Office Action makes specific reference to Col. 6, Lines 18-22 of Krall's Description, citing: "The charge voltage control circuit 43 preferably includes a comparator which, by monitoring the voltage drop across the resistor 23 during charging, abruptly changes the control voltage in the line 45 when the charging current to the batteries 11-13 falls to a level I.sub.c. This is shown to occur at time t1 in FIG. 3B."

And, just as with Krall's resistive element 23 so, too, the cited reference to the prior art's charge voltage control 43 does not teach what the Office Action relies upon. Krall clearly labels element 43 in Fig. 1 as a "Charge Voltage Control" and, therefore, it is evident that a method of charging batteries 11-13 (Fig. 1) is the specifically what the cited prior art is teaching. Since applicant's subject claims recite resistive loads for the purpose of "determining an anticipated fully charged battery voltage," so as to solve the problem of delivering an appropriate voltage to a host device, the apparatus of applicant's claims 52 and 78 does not require or

use a charge voltage control element.

3. *The Reference Is Misunderstood As To Applicant's*

Detecting The Extent Of Voltage Sag Reading on Krall

The Office Action further alleges that applicant's recited "detecting the extent of voltage sag upon preloading said battery" in claims 52 and 78 reads on the prior art. Specifically, the Office Action cites two references to Krall's Description:

"The charge voltage control circuit 43 preferably includes a comparator which, by monitoring the voltage drop across the resistor 23 during charging, abruptly changes the control voltage in the line 45 when the charging current to the batteries 11-13 falls to a level I.sub.c. This is shown to occur at time t1 in FIG. 3B;" (Col. 6, lines 18-22), and

"The voltage then remains flat after that time, and the charging current begins to decrease, as shown by FIG. 4B. When that current drops to a threshold level I.sub.c, at which point the comparator within the control circuit 43 switches its output level, the output voltage in line 39 drops to a maintenance level as shown in FIG. 4A." (Col. 6, Lines 56-62).

Again, the above references cited by the Office Action relate to the prior art's battery charging circuits 17, and applicant's claims recite an apparatus (and method) for configuring a power supply to output a voltage, based on analyzing a detected voltage sag consequential to a resistive load having been applied at a battery, and then that load being varied. To overstate the obvious, applicant's claimed battery is not in an active charging state at the time the resistive load is applied, nor is there any direct or indirect reference -- or even inference -- in the subject claim to battery charging.

It is apparent that, both in this and the previous cited references to Krall that are relied on in the Office Action's objections, that applicant's invention is solving a different problem. The problem applicant's claims address is how to determine and supply an appropriate voltage to a battery-powered device, while the cited references to Krall clearly are cited in the prior art's Description as solving a problem of charging a 12-volt lead-acid battery.

4. *Applicant's Claimed Analyzing Voltage Sag Does Not Read On Krall*

Applicant's subject claims further recite that, upon detecting the extent of voltage sag caused by preloading a battery, the apparatus of Claim 52 (and the method of Claim 78) are then "analyzing said detected voltage sag and determining the anticipated fully charged battery voltage." The Office Action, in alleging that this reads on Krall, relies on Col. 7, lines 22-26 of his Description, which recites:

"This maximum current is set to be consistent with a maximum sustainable current capability of the batteries themselves, and the likely current draw of equipment connected to the output terminals 31."

The Office Action clarifies that the above citation from Krall is specific to his recitation regarding "the maximum sustainable current capacity of the batteries themselves."

The clause of the subject claims objected to in the Office Action does not address the issue of the subject battery being analyzed to determine its maximum sustainable current capacity. Instead, the claims recite that the analyzing is for determining the anticipated fully-charge voltage of the battery. Thus, the citation from Krall is misapplied, and applicant's claimed invention is solving a different problem than the Office Action's reference to the prior art (*In re Wright*, 6 USPQ2d 1959 (1988)).

Summary

Applicant's response to the Office Action's 102 objections that applicant's claims 52 and 78 are anticipated by Krall has addressed three major areas wherein significant difference in physical features between Krall's and applicant's claimed inventions. The "Comparative Overview of Operating Environments" focused on a simplified depiction of the two apparatuses (Sketch A) to illustrate how each used their elements in different operational configurations. In the section "Applicant's Claims Terminology As Applied To Krall's Invention" the focus was on the specific terms in claims 52 and 78's preambles and closing clauses, with examples of how the terms read on elements of each of the disparate inventions. The final section "Detailed Discussion Of The Office Action's Specific Cited Objections" applicant overcame the 102 with further sketches depicting physical features and configuration differences that distinguish Krall from applicant's claimed invention. Also, throughout the response, numerous examples were cited of problems and flaws in Krall's apparatus, some of which render his invention inoperative. The following is summarization of some of the salient points previously presented, but this summary is not comprehensive, and is not intended to replace the full discussions:

- Krall's invention has not solved the problem it professes to resolve, namely to provide a mobile traveler with an apparatus that eliminates the need to carry multiple power supplies and to carry awkward battery packs and power supplies. But, the apparatus taught by the prior art is large and cumbersome, awkward, and requires transporting at least two power supplies. By comparison, applicant's single compact configurable power supply module solves the problem in a superior way.
- The prior art's apparatus is very energy inefficient, primarily because it wastes its stored battery energy by using these resources to recharge an internal battery of a host device, such recharging operation being inescapable because all devices that have

internal rechargeable batteries automatically commence battery charging when Krall's power is received at the device's power-input receptacle. Applicant's new connector interface adaptation, which electrically attaches to a device's battery-to-host connector, resolves Krall's power-consumption problem by selectably disabling the device's internal battery. The different interfaces for attaching to a host device are a key physical differentiator that it appears repeatedly in applicant's response, and the ramifications for Krall ripple throughout.

- Applicant's subject claims recite "a powered device which is adapted to receive power," but Krall teaches a non-adapted device (i.e., "a power supply that is adaptable). Applicant's contrarian approach results in superior performance, because it resolves a problem in the prior art of requiring a user to manually adjust an output voltage.
- Krall's teaches an apparatus that electrically attaches to a device's existing power-input receptacle, then alleges that in doing so, the apparatus has access to the device's internal battery voltage. This is unsubstantiated by Krall, and applicant's response refutes the prior art's allegation, including a real-world example of a notebook computer, thereby supporting the position that Krall's apparatus is inoperative.
- Applicant shows, by citing a corroborating published survey of mobile devices, that the prior art's teachings are ancient, weak, and should be construed narrowly.
- Applicant expands his prior argument that Krall's apparatus, especially by teaching using a battery as a source of power for a power supply that delivers power to a device that includes an internal rechargeable battery, results in excessive power inefficiencies and produces other unresolved problems and shortcomings. Calculations of battery capacity are used to validate applicant's arguments. Applicant also presents a hypothetical model that describes how the prior art, by delivering its power through applicant's innovative battery connector interface (instead of the

device's existing power-input receptacle as taught by Krall) results in superior power efficiencies and extended run times for Krall's battery. Further evidence supporting applicant's argument that applicant's battery interface improves Krall's battery run time by as much as 85% is presented by applying calculated battery performance data to an actual laptop.

- Unlike applicant's claimed invention that adapts host devices, the prior art is shown to be flawed by its attaching to a non-adapted device's power-input receptacle because Krall's apparatus: 1) does not resolve device manufacturers' input-voltage tolerance issues; 2) requires costly and impractical constant updates to the resistive values of its user-adjustable potentiometer (or its software) every time device manufacturers change their input voltage requirements. Applicant validates these issues with laptop device surveys that reflect these devices during the time period that Krall's application was filed.
- Applicant further expands another flaw in Krall's teachings, focused on the prior art's reliance on unpredictable user adjusting of Krall's variable-resistance potentiometer. Evidence is presented of the input power requirements as presented on the indicia of an IBM laptop and its OEM external power-conversion adapter. Further discussion addresses Krall's allegedly "automatically adjusting" modality of his invention shows that, because the device manufacturer-specified input voltage deliverable at the prior art's power-input receptacle is incalculable from Krall's acquiring a device's internal battery voltage. Applicant's claimed invention eliminates Krall's unpredictable user adjustments. Applicant's claims 52 and 78 resolve the prior art's unworkable dilemma of determining a device's input voltage, by acquiring information directly from a device's battery by means of a new connector interface, then manipulating the acquired voltage value, and analyzing that information to determining a configuration of a power supply that outputs its power signal to the device by accessing the battery-to-device connector.

- Applicant's claimed invention recites an apparatus that *selectably* accesses a device's internal battery and a configurable power supply, and does so by means of applicant's new battery connector interface which -- either manually or without user manipulation -- selects either of these elements as required by the various steps in the program instructions of the apparatus. Krall teaches selecting of his external battery source (not a device's battery), or an external AC/DC (or DC/DC) power source for powering his power-output circuit 19. Therefore, applicant's and Krall's apparatuses have distinctively different physical configurations, as applicant validates through sketches, references to the prior art and applicant's Specification.
- Through citations from Krall's Description, and sketches that compare the two apparatuses, applicant presents reasoned arguments as to why claims 52 and 78 do not read on the prior art. In particular, distinctions between Krall's battery power source and applicant's battery internal to a host device are clarified, to prove that the references cited in the Office Action are misunderstood and, that applying them here strains the subject interpretation.
- Applicant cites the phrase "instead of" as used in his claims 52 and 78 as a clear differentiator between Krall's battery 11-13, which is always used with (and not instead of) his adjustable power supply, whereas applicant's claims recite that the configurable power supply is used instead of the battery.
- Applicant's response further includes a reasoned arguments that address each line of the subject claims cited in the Office Action, the highlights of which include:
 - ◆ Applicant's claimed resistive load does not, as alleged in the Office Action, read on the prior art's resistor 23, because Krall's resistor is part of his battery charging circuit 17, and not his power-output circuit 19. Therefore the reference, as cited, is misunderstood, even though Krall's Description does make one reference to

resistor 23 in the context of the power-output circuit 19, but only to state that the power signal passes through his resistor 23.

- ◆ Further, applicant provides reasoned arguments that the subject claims recitation of "varying said resistive load on said battery" for determining an output voltage of a configurable power supply is not anticipated by Krall because, again, the Office Action's cited references to the prior art's elements 23 and 43 also are taught by Krall in the context of his charging circuit 17, and not his voltage configuration circuit.
- ◆ The Office Action's objection to the subject claims recitation: "analyzing said detected voltage sag and determining the anticipated fully charged battery voltage" is overcome by applicant through reasoned arguments that the references to Krall are specific to his teachings about adjusting current to be consistent with the current capacity of his battery power source. But, applicant's claims are solving a different problem, specifically a method of determining an output voltage of a power supply by applying and varying a resistive load to a device's internal battery.

This Summary is not comprehensive, and is not intended -- in and of itself -- to serve as a full response to the objections raised in the instant Office Action. Nevertheless, the highlights presented here do point to reasoned arguments in applicant's full response having successfully overcome the objections to claims 52 and 78 under 35 U.S.C. 102(b) as being anticipated by Krall (5,621,299).

Accordingly, by the above reasoned arguments and cited references and examples, applicant has overcome the objections raised in the Office Action as to claims 52 and 78 being anticipated by Krall. Therefore applicant respectfully requests that the claim rejections under 35 USC §102 be withdrawn.

REMARKS

The Examiner is advised that a Petition for a three month extension of time is enclosed, together with fee based on small entity.

Please acknowledge receipt hereof by stamping and returning the enclosed return postcard.

Applicant is available by phone at (818) 340-7268, or fax at (818) 887-3197.

Enclosed:

"Exhibit A" (1 sheet)

"Exhibit B" (1 sheet)

"Exhibit C" (6 sheets)

Transmittal Form

Fee Transmittal

Petition for Extension of Time

Check

Return Postcard

Respectfully submitted,



Patrick Potega
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I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail #EU662600876US in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on

21 AUGUST 2003

(Date of Deposit)

PATRICK H. POTEGA

(Name of Applicant, Assignee or Registered Representative)

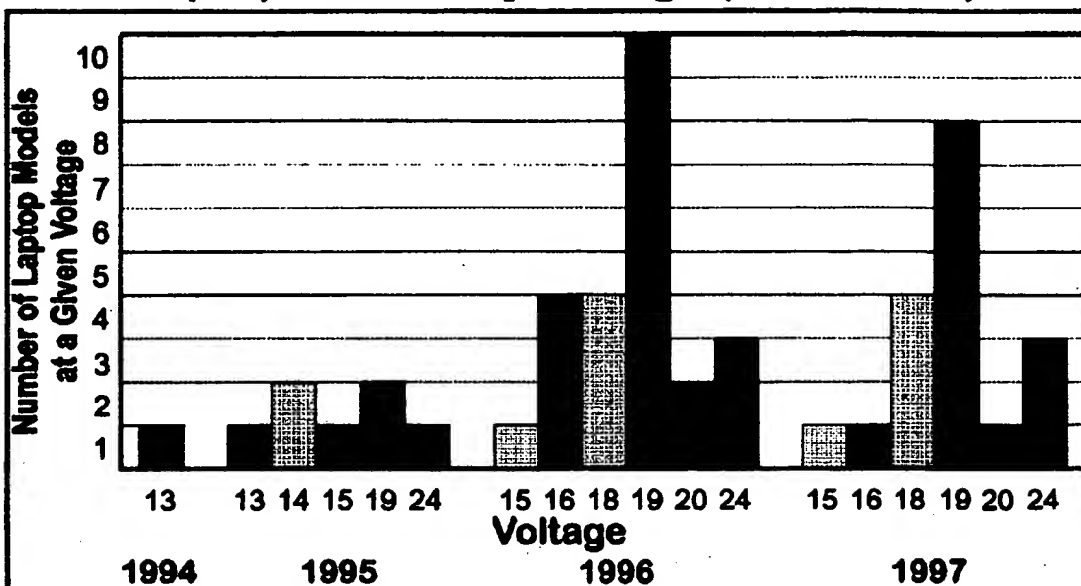

(Signature)

8/21/03

(Date)



Laptop Models By Voltage (1994-1997)



Notes:

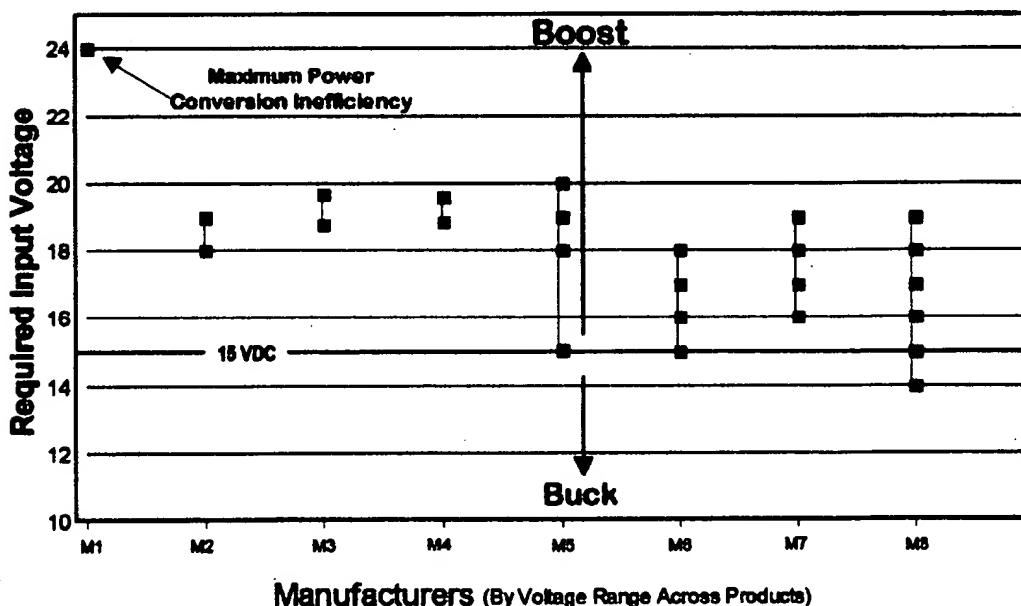
Of the respondents, only one manufacturer indicated a voltage for 1994.

For 1995, three manufacturers responded to this question.

For 1996 and 1997, all respondents reported information.

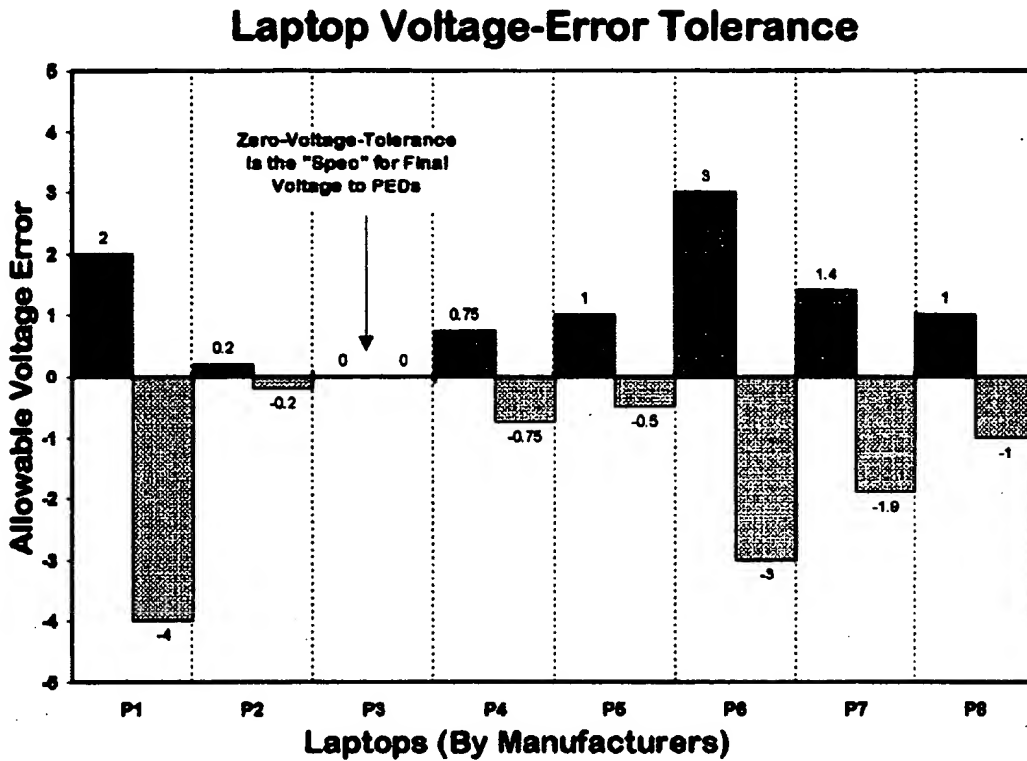
2). Projected or anticipated input voltage of these products for 1998 is:

Laptop Voltage Boost vs. Buck Comparison

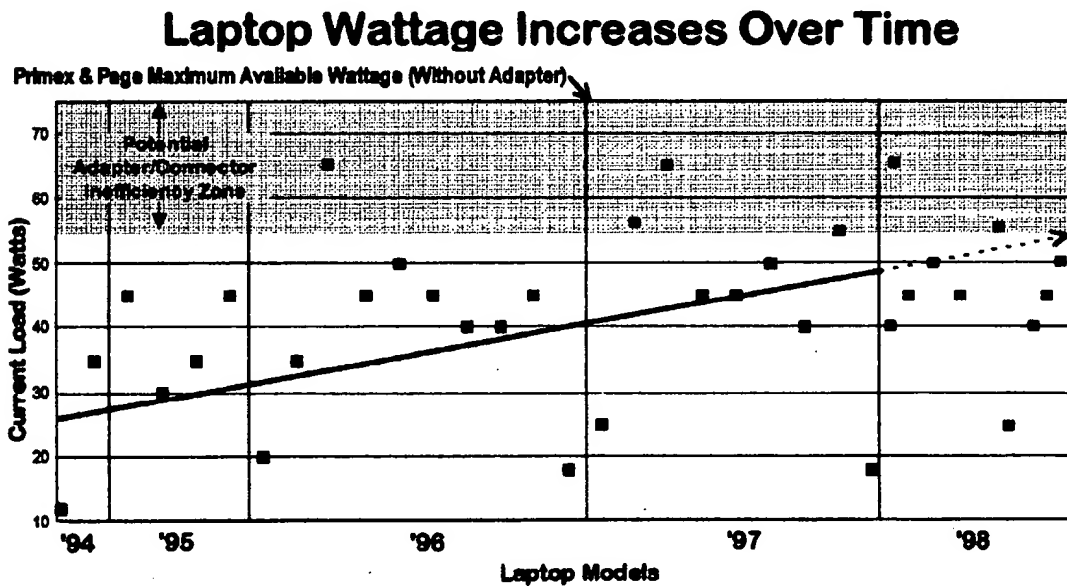


3). What variance on the above target or optimal input voltages to your products will be tolerated without degrading system performance? For example, if your specified input voltage is 15 VDC, is 15 VDC +/- 3 volts acceptable, or must the input voltage be exact? + _____ and - _____ volts above and below the above-specified voltages.

RESPONSE, expressed as the following chart:



4). Identify the historical wattage of your products (if possible, be product specific, but a wattage range of all products is acceptable):



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Fast Index Key	LiON Battery	MEMO Battery	HC240 Battery	AC Adapter	Charger	Auto Power Card DC	AccePM Power Card DC	1000 Module	2000 Module	Port Replicator	40 GB Hard Drive
Ac 60 850	8540 \$439	8539 \$189						21070 \$99	CALL		
Accerlino 350, Light 350, Light 350	8545 \$299	8539 \$139		8622 \$149		14511 \$99	23016 \$99	CALL	CALL		
Accerlino Light 350, Light 301, Light 303, Light Series		6710 \$109		8622 \$149		14511 \$99	23016 \$99	CALL	CALL		
Accerlino 372, 372, 372, 372 Plus	22442 \$249						23018 \$99	CALL	CALL		
Accerlino 374, 374 Plus, E810	22444 \$249						23018 \$99	CALL	CALL		
Accerlino 731, 730C, 735, 735C, 760, 760C, 760C, 760, 760, 760, 760C, 760C		2623 \$109	4891 \$99			6170 \$99		CALL	CALL		24621 \$399
Accerlino 794, 790C		3140 \$159	5428 \$119					CALL	CALL		31229 \$399
Accerlino 791, Accerlino 790C, 760C, 760, 760, 760C, 760C		11553 \$109	14253 \$99			22390 \$99	23023 \$99	CALL	CALL		
Accerlino 970, 971, 972, 975	31142 \$315			31141 \$99		22392 \$110		CALL	CALL		
Accerlino Nuova, 1A7000	22699 \$315			20679 \$99				CALL	CALL		
486 MC, 7255M, N12531		6723 \$109	6628 \$99	11930 \$110	11537 \$99			CALL	CALL		
N100-450, N750, N761, N1007-650, DX4175		5005 \$139						CALL	CALL		
Rodeo 3000EX, 3010EX, 3015EX, 3020EX, 3030EX, 3035EX, 3040EX, 3045EX, 3050EX	27258 \$219			27118 \$99	27262 \$109			CALL	CALL	27291 \$209	
Duo 210, 230, 230, 250, 270, 270C, Duo 280, 280C		11128 \$109	10588 \$99	11972 \$99	16970 \$99		22040 \$99	CALL	CALL		
Powerbook 140, 145, 145B, 150, 155, 170		11070 \$99	11070 \$99	11880 \$99	11078 \$99		23034 \$99	CALL	CALL		
Powerbook 195C, 170C, 190, 190C		10520 \$139		8752 \$79	16916 \$99	16917 \$99	23128 \$99	CALL	CALL		
Powerbook 190, 190C, 5000 Series, 5300, 5300C, 5300CE, 5300CS		16228 \$149		15024 \$99	16229 \$109		21812 \$71	CALL	CALL		
Powerbook 140, 140C		21811 \$149		22628 \$99	22627 \$109	20505 \$109	21311 \$99	21815 \$149	21815 \$149		
Powerbook 300	20588 \$299	2634 \$139		25368 \$99			23132 \$99	21815 \$149	21815 \$149		
Powerbook 330, 330C, 340, 340C				26725 \$99			27002 \$99	64559 \$139	64559 \$139		
Powerbook 340	26724 \$279						27664 \$99	28909 \$49	28910 \$129		
ARMANON TS1200		26238 \$99		26537 \$99				CALL	CALL		
ARMANON TS175	26538 \$149	26538 \$99		26530 \$99				CALL	CALL		
ARMANON TS307	26534 \$299			26775 \$99				CALL	CALL		
ARMANON TS3300, TS37MX	26532 \$499				25594 \$99			CALL	CALL		
Advantage NB-665SX/33	8073 \$139	4939 \$189		5354 \$129				CALL	CALL		
Accerlino A, 450, 470	1681 \$179	1681 \$139					23137 \$99	25704 \$99	25705 \$99		31237 \$399
Accerlino 800M, Accerlino 810M	9001 \$119	2665 \$129	6103 \$118	6355 \$119			23138 \$99	6507 \$72	CALL		36288 \$399
Accerlino 900M				11801 \$99			25050 \$99	CALL	CALL		36267 \$399
Accerlino 910M, Accerlino 920M	6074 \$189					11550 \$99		6509 \$79	6509 \$149	11082 \$189	28421 \$399
Accerlino 1, Accerlino 1.5M, Accerlino 1.5M	6702 \$219							CALL	CALL		
Accerlino 1.5M,											

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Fast Index Key	LION Battery	NUMH Battery	NECAD Battery	AC Adapter	Charger	Auto Power Cord DC	Power Cord DC	16MB Module	32MB Module	Port Replicator	4.0 GB Hard Drive
Innova 10C, Innova Book 10 Series		4702 \$119	4701 \$80					CALL	CALL		3129 \$399
Innova Book 200.S		8139 \$141					23151 \$99	21841 \$69	CALL		31240 \$399
Innova Book 300C, 300CD, 4750CS, 4750CT		11804 \$126						21841 \$69	CALL		
Innova Book 4750CS, 4750CT, 300P		11804 \$126						21841 \$69	CALL		
Innova Book 4800CS, 4800CT		20819 \$139						21841 \$69	CALL		
Notepad III, Notepad III CX P120		11224 \$139					23156 \$99	CALL	CALL		
Smartbook V-Pro/Ease		20839 \$139						CALL	CALL		
Smartbook V-Star, V-Star Plus		20843 \$139						CALL	CALL		
Compaq Aero 475C, Aero 475C		2263 \$99						5573 \$79	CALL	2401 \$89	24513 \$399
Armada 1100, 1100C, 1120, 1120T, 1125, 1130, 1130T		11868 \$99						10774 \$65	CALL	22413 \$119	24520 \$399
Armada 1500, 1500S, 1510, 1520, 1530, 1535, 1540		21852 \$149						21857 \$69	CALL	22427 \$119	24520 \$399
Armada 1550, 1550, 1571, 1580, 1585, 1590, 1592, 1595, Armada SB		21551 \$148						21857 \$69	CALL	22429 \$119	24520 \$399
Armada 3000		32193 \$229						CALL	CALL		
Armada 4110, 4110, 4120, 4120T, 4125, 4130T, 4131T, 4150, 4180T		9223 \$209					22195 \$119	24057 \$80	24109 \$125		28347 \$399
Armada 7330, 7330 MT, 7330T, 7350MT, 7350DMT, 7350DMT, 7350DMT		22657 \$229						23358 \$49	23361 \$69		31184 \$399
Armada 7700, 7700MT, 7750MT, 7750MT		21737 \$239						21860 \$49	21864 \$69	22430 \$105	24539 \$399
Armada 7700, 7700, 7750		22653 \$239						21860 \$49	21864 \$69		24539 \$399
Concerto 475, 475		8514 \$149						CALL	CALL		31542 \$399
Concerto 370, 375, 375C, 475, 475C, 475C		9488 \$119					8511 \$99	CALL	CALL		31171 \$399
Compaq 400, 400C, 400CX, 410C		8369 \$99					8178 \$99	CALL	CALL		31171 \$399
Compaq 410CX, 420C, 430CX, 430C, 430CX		8369 \$99					8178 \$99	CALL	CALL		31171 \$399
LTE 2600 series, 2601 series, 260								CALL	CALL		24256 \$399
LTE 5000, 5100, 5100, 5200, 5200, 5300, 5300, 5400		6902 \$290						CALL	CALL		24500 \$399
LTE 5400, 5400, 5400, 5400, 5400, 5400, 5400								CALL	CALL		31159 \$399
Elite 450 CX, Elite 475C, Elite 475C		10051 \$149						10076 \$69	CALL		
LTE Lite 20, 20C, 20C, 25C, 25C, 25C, 25C, 25C		11694 \$126						CALL	CALL		
Presario 1010, 1020, 1030, 1060, 1070, 1075, 1080		21719 \$219						42526 \$85	21875 \$110	22431 \$105	24527 \$399
Presario 1210, 1215, 1220, 1230, 1235, 1235, 1237		25715 \$179						42526 \$85	CALL		24527 \$399
Presario 1240, 1250, 1250		30728 \$139						42527 \$85	CALL		24527 \$399
Presario 1610, 1620, 1621, 1622, 1625, 1626		25716 \$179						42527 \$85	CALL		24527 \$399
Presario 1640, 1650, 1655, 1660, 1661		25708 \$179						42527 \$85	CALL		24527 \$399
Presario 1710		30167 \$149						42527 \$85	CALL		24527 \$399
CSX, TS340C 25		5382 \$99						CALL	CALL		
Bravo Series, EdBook 400 Series, 400T, 500 Series, 500T		5173 \$109						CALL	CALL		
EdBook 700MS, 700MT, 700MS, 700MT		25738 \$139						CALL	CALL		
EdBook 770MS, 770L, 770MS, 770MT, 770MS, 770MT		25748 \$139						CALL	CALL		
770MS, 770MT, 700CS								CALL	CALL		
HiNote VP700, 710, 717, 725, 735, 745		33478 \$239						CALL	CALL	23492 \$105	
HiNote VP 900, VP 910, VP 920, VP 930, VP 940, VP 950, VP 960, VP 970, VP 980, VP 990		20874* \$149						22639 \$79	22642 \$139		24843 \$399
PC 450C, PC 455C, PC 455SE								CALL	CALL		
300N, 325N, 325MC, 325SI		1827 \$159						CALL	CALL		
Inspiron 3000, 3000		20713 \$209						CALL	CALL		
Latitude 425, 425, 425C, 425CX, 425C		14058 \$139						CALL	CALL		31743 \$399
Latitude 475C, 475C, 475C, 475C, 475C		5986 \$119						22657 \$75	CALL		
Latitude LM Series								21868 \$95	CALL		31728 \$399
Latitude XP1		23442 \$199						22639 \$95	CALL		26401 \$399
Latitude CP, CP1		23798 \$199						22639 \$95	22641 \$99		
ML20, ML25, ML25C		25708 \$169						CALL	CALL		31745 \$399

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1786	with 1824-50	J.H. H.		John Power	1824-50	1850-59	1860-69	1870-79	1880-89	1890-99	1900-09	1910-19
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Fast Index Key

ThinkPad 750CD, 750CE, 750CSE (AC AutoIn-flight adapter may NOT charge battery but will power notebook)	8361 \$159	20592 \$79	8394 \$89	22028 \$99	CALL	23771 \$149	18357 \$189	\$1247 \$399
ThinkPad 750CDV, 750CV, 750CX, 750CX (AC AutoIn-flight adapter may NOT charge battery but will power notebook)	6388 \$222	20895 \$79		31042 \$99	23062 \$100	10259 \$149	23772 \$179	
ThinkPad 750D, 750L (AC AutoIn-flight adapter may NOT charge battery but will power notebook)	25408 \$399	29176 \$79		31040 \$99	CALL	CALL		
ThinkPad 750C, 750CD, 750E, 750ED, 750EL, 750ELD, 750L, 750LD, 750UD, 750U (AC AutoIn-flight adapter may NOT charge battery but will power notebook)	16720 \$269	16721 \$79		16724 \$99	22833 \$99	CALL \$90	18307 \$189	Call \$399
ThinkPad 750CD, 750E, 750ED, 750EL, 750ELD, 750L, 750LD, 750UD, 750U (AC AutoIn-flight adapter may NOT charge battery but will power notebook)	6929 \$269	6938 \$79		10038 \$99	22930 \$99	CALL	18308 \$189	Call \$399
ThinkPad 770, 770ED	25298 \$299	25299 \$99		22017 \$99	28913 \$90	28921 \$99		31251 \$399
TS 30A	10721 \$159	11382 \$110			CALL	CALL		
TS 30AC, AS, AT	30192 \$109				CALL	CALL		
TS 30CH, CS, E, EP, EP6	29494 \$145				CALL	CALL		
Keynote 6000	27721 \$189	27719 \$99			CALL	CALL		
Keynote 6000, 6060	27716 \$189	27718 \$99			CALL	CALL		
Keynote 6000	27722 \$189	27723 \$129			CALL	CALL		
Metrotech II, III	27428 \$179		27430 \$169		CALL	CALL	27438 \$209	
Metrotech IV	27440 \$199		27439 \$109		CALL	CALL	27436 \$279	
Golbook	26948 \$239	26950 \$99			CALL	CALL		
Millennia Transport XPE	26904 \$239	27230 \$99			CALL	CALL		
Millennia Transport VIX	26745 \$199	26792 \$99			CALL	CALL		
Millennia XOE	26988 \$229	26791 \$99			CALL	CALL		
MPX	26905 \$239	25748 \$99			CALL	CALL		
Trak	26949 \$179				CALL	CALL		
Elio 687/7A, 13453/25		6437 \$99			CALL	CALL		
Elio Soundbook II, Elio TS30AL, Elio TS30S		4895 \$139			CALL	CALL		
TS30CS, CH, E, EP, EP6		29498 \$145			CALL	CALL		
TS3A, TS38S		10056 \$99			CALL	CALL		
3750		5143 \$99			CALL	CALL		
3770SL, 3160, 3161		14659 \$191			CALL	CALL		
Mobile Pro 200, 400, 400, 780		28637 \$10			CALL	CALL		
Mobile Pro 750	29988 \$79	29990 \$99			CALL	CALL		
UltraLite SL/SL, SL/20P, SL/25C		1940 \$77			CALL	CALL		
UltraLite Versa 20C, 20CE, 20CV, 25C, 25CE, 25CV, 40EC, 40D12, 50AL, 50 EL, EV		14655 \$149			CALL	CALL		
UltraLite Versa M, Versa P		9257 \$199			CALL	CALL		
UltraLite Versa S		4951 \$199			CALL	CALL		
Versa 550, 550L		18791 \$10			CALL	CALL		
Versa 800, 800H, 800X, 800XAL, 800XAL, 800XAL, 800XAL					CALL	CALL		
ZoomAX, ZoomAX, 659		8637 \$199			CALL	CALL		
Versa 200, 200C, 200D, 200E, 200F, 2250		8613 \$249			CALL	CALL		
Versa 400, 400C, 400D, 400E, 400F, 400G, 400H, 400I, 400J, 400K, 400L, 400M, 400N, 400O, 400P, 400Q, 400R, 400S, 400T, 400U, 400V, 400W, 400X, 400Y, 400Z		6273 \$229			CALL	CALL		
Versa 500, 500C, 500D, 500E, 500F, 500G, 500H, 500I, 500J, 500K, 500L, 500M, 500N, 500O, 500P, 500Q, 500R, 500S, 500T, 500U, 500V, 500W, 500X, 500Y, 500Z		28821 \$229			CALL	CALL		

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We carry every battery for every notebook, but couldn't list them all. Acer, ALR, Ambra, Ams, Arn, ATT, Austin, BOC, Bondwell, Chaplet, Chem USA, Chicory, Commax, Compuquad, Compuquyen, CTX, DTK, Eosrex, Hyundain, Infotek, Janta, Kaydeta, Kiwi Competitor, Leading Edge, Midwest Micro, Mitsuuba, Olivetti, PC Brand, Sager, US Flex, Veridate, Vector, and more! If you don't see yours listed please call us and we'll get it for you.

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